New England Common Assessment Program

Released Items
## Support Materials
2008

Grade 7
Mathematics

> **N&O 6.1** **Demonstrates conceptual understanding of rational numbers with respect to** ratios (comparison of two whole numbers by division *a/b*, *a:b*, and *a ÷ b*, where *b ≠ 0*); and rates (e.g., a out of b, 25%) using models, explanations, or other representations.

1 Which measure describes a rate?

   A. the distance a car is driven

   B. the number of points a team scores

   C. the amount of money earned per hour

   D. the total mass of 10 bowling pins

N&O 6.2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing <u>numbers with whole number bases and whole number exponents (e.g., 3^3, 4^3)</u>, integers, or <u>rational numbers within and across number formats (fractions, decimals, or whole number percents from 1–100)</u> using number lines or <u>equality and inequality symbols</u>.

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2 Jenn is putting her wrenches away. She is missing a wrench with a size between $\frac{5}{8}$ inch and $\frac{3}{4}$ inch.
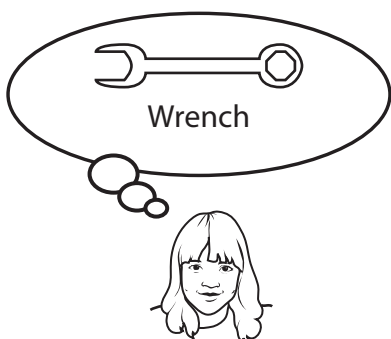
Wrench

Which size wrench is missing?

A. $\frac{1}{2}$ inch

B. $\frac{9}{16}$ inch

C. $\frac{11}{16}$ inch

D. $\frac{7}{8}$ inch

N&O 6.3 **Demonstrates conceptual understanding of mathematical operations** by <u>describing or illustrating the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g., 3^3, 4^3)</u>; and <u>the effect on the magnitude of a whole number when multiplying or dividing it by a whole number, decimal, or fraction</u>.

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3 Look at this number sentence.

$$1400 = 2 \times 2 \times 2 \times 5 \times 5 \times 7$$

Which expression is equivalent to 1400?

A. $2^3 \times 5^2 \times 7^1$

B. $2^3 \times 5^2 \times 7^0$

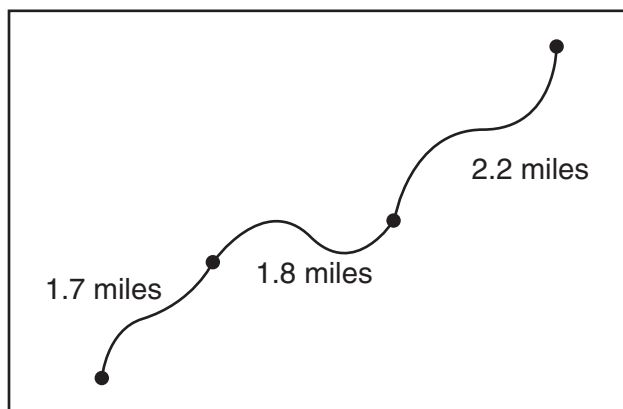C. $2^2 \times 5^1 \times 7^1$

D. $2^2 \times 5^1 \times 7^0$

> **N&O 6.4** **Accurately solves problems involving** single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT*: Applies the conventions of order of operations with and without parentheses.*)

4 Look at this map.

River View Trail

2.2 miles

1.8 miles

1.7 miles

The Hikers Club is planning to clean River View Trail. The Hikers Club members separated into 3 groups. Each group will clean the same length of trail. How many miles of trail will each group clean?

A. 1.6

B. 1.9

C. 2.3

D. 2.7

> **N&O 6.4** **Accurately solves problems involving** <u>single or multiple operations on fractions (proper, improper, and mixed)</u>, <u>or decimals</u>; and <u>addition or subtraction of integers</u>; <u>percent of a whole</u>; or <u>problems involving greatest common factor or least common multiple</u>. (IMPORTANT*: Applies the conventions of order of operations with and without parentheses.*)

5 Allen has a piece of rope that is 84 inches long. He cuts off one piece that is $43\frac{3}{4}$ inches long and another piece that is $31\frac{5}{8}$ inches long. What is the length of the remaining piece of rope after the two cuts are made?

A. $8\frac{5}{8}$ inches

B. $9\frac{1}{3}$ inches

C. $9\frac{5}{8}$ inches

D. $10\frac{1}{3}$ inches

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G&M 6.3 **Uses properties or attributes** (shape of bases, number of lateral faces, number of bases, <u>number of edges</u>, or <u>number of vertices</u>) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

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6 A three-dimensional shape has exactly 4 faces.
Which three-dimensional shape could it be?

A. rectangular prism

B. rectangular pyramid

C. triangular prism

D. triangular pyramid

G&M 6.5 <u>**Demonstrates conceptual understanding of similarity**</u> by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or[sc] explanations.

7 Triangle *JKL* is similar to triangle *PQR* ($\triangle JKL \sim \triangle PQR$).
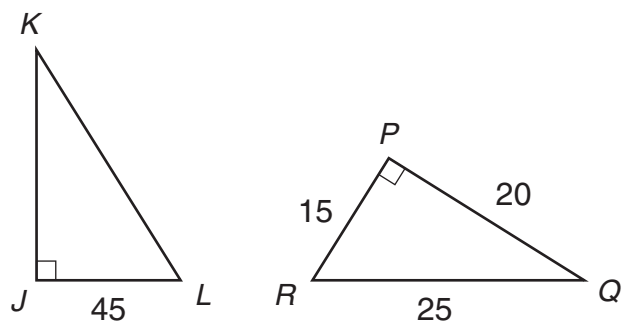
not drawn to scale

Which statement is true?

A. $\triangle JKL$ and $\triangle PQR$ have the same area.

B. $\triangle JKL$ and $\triangle PQR$ have the same perimeter.

C. The ratio of the area of $\triangle JKL$ to the area of $\triangle PQR$ is 3:1.

D. The ratio of the perimeter of $\triangle JKL$ to the perimeter of $\triangle PQR$ is 3:1.

F&A 6.3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving two or more of the four operations; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when x=4 given y = 3x-2).

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8 Look at this equation.

$$m = 5 + 0.25t$$

What is the value of m when the value of t is 10?

A. 7.50

B. 15.25

C. 20.00

D. 52.50

F&A 6.4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.

9 Look at this balanced scale.
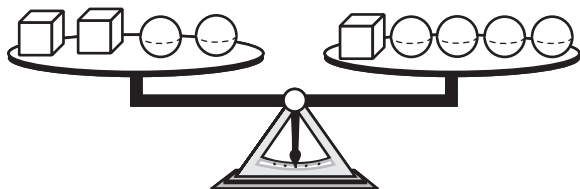
Each ⊖ weighs s pounds. Each ⬜ weighs c pounds. Which equation is shown by this scale?

A. $6c = 3s$

B. $4cs = 5sc$

C. $c^2 + s^2 = c + s^4$

D. $2c + 2s = c + 4s$

DSP 6.1   **Interprets a given representation** (circle graphs, line graphs, <u>or stem-and-leaf plots</u>) to answer questions related to the data, to analyze the data, to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: Analyzes data consistent with concepts and skills in M(DSP)-6-2.)

10 This stem-and-leaf plot shows the daily high temperatures for two weeks in July.

```
7 | 0 1 1 2 2 7
8 | 1 5 6 6 6
9 | 0 1 2
```
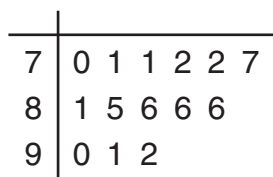
Key
7 │ 1 represents 71°F

What was the mode temperature for these two weeks?

A. 77°F

B. 83°F

C. 86°F

D. 92°F

N&O 6.2 **Demonstrates understanding of the relative magnitude of numbers** by ordering or comparing <u>numbers with whole number bases and whole number exponents (e.g., 3^3, 4^3)</u>, integers, or <u>rational numbers within and across number formats (fractions, decimals, or whole number percents from 1–100)</u> using number lines or <u>equality and inequality symbols</u>.

⓫ Look at this number line.
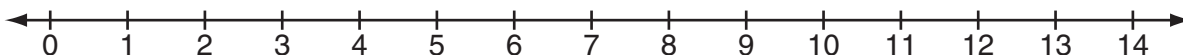
Draw a point for the number $\frac{13}{4}$ on the number line.

Scoring Guide

Score	Description
1	Student identifies correct location for $\frac{13}{4}$ on number line.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

SCORE POINT 1
(EXAMPLE A)

⑪

$\frac{13}{4} = 3\frac{1}{4}$
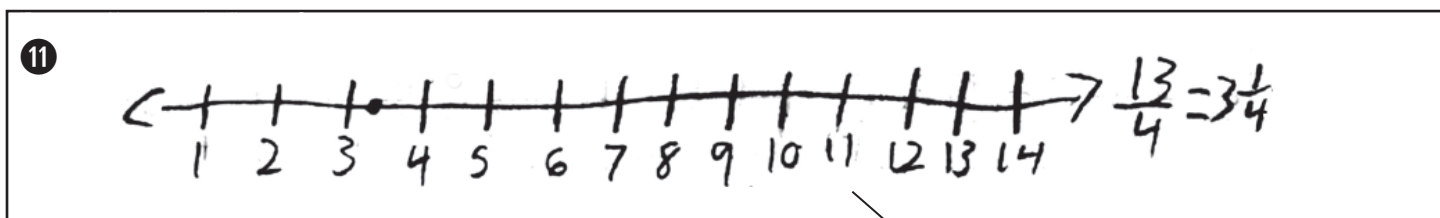
> Student's response is correct.
> (Explanation is not required.)

SCORE POINT 1
(EXAMPLE B)

⑪

> Student's response is correct.

SCORE POINT 0
(EXAMPLE A)

⑪

> Student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

⑪
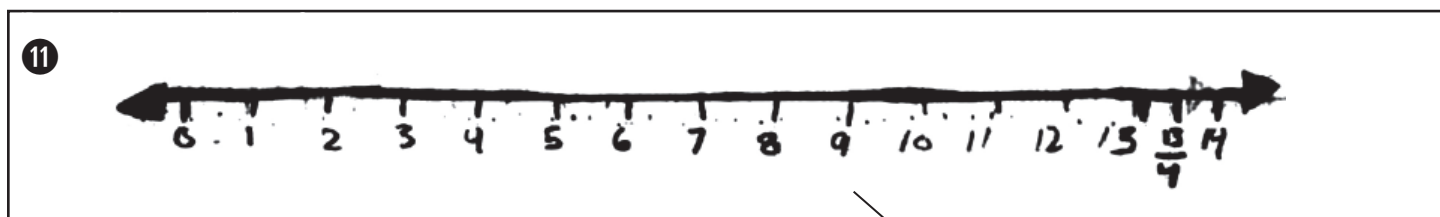
> Student's response is incorrect.

> **G&M 6.3** **Uses properties or attributes** (shape of bases, number of lateral faces, number of bases, <u>number of edges</u>, or <u>number of vertices</u>) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

⓬ Look at this three-dimensional figure.
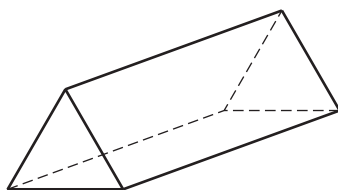
How many vertices does the figure have?

Scoring Guide

Score	Description
1	Student gives correct answer, **6** (vertices).
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

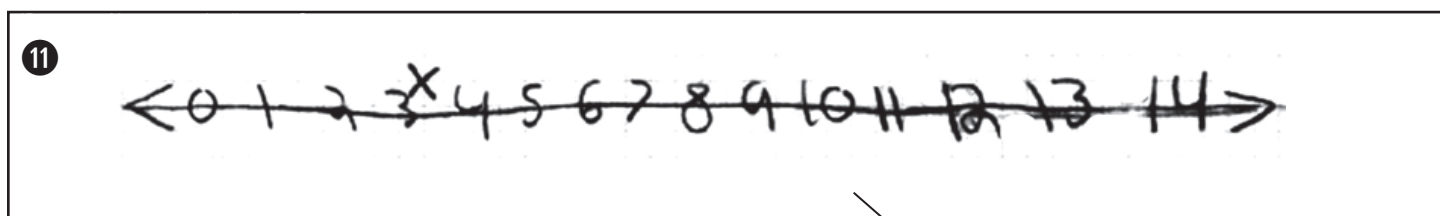**SCORE POINT 1
(EXAMPLE A)**

⑫

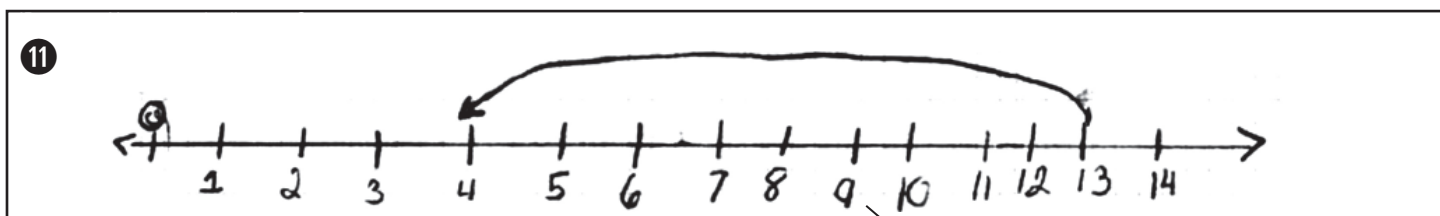

There are ⑥ vertices

Student's response is correct.
(Showing work is not required.)

**SCORE POINT 1
(EXAMPLE B)**

⑫

6

Student's response is correct.

**SCORE POINT 0
(EXAMPLE A)**

⑫

I think it has five vertices in it because if you were to unfold it you would be able to see it.

Student's response is incorrect.

**SCORE POINT 0
(EXAMPLE B)**

⑫

12 vertices

Student's response is incorrect.

14

G&M 6.1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish** among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

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⑬ A square is divided into two triangles by one of its diagonals.

    a. Use one of the words *acute*, *obtuse*, or *right* to tell what kind of triangles are formed. Explain your answer.

    Another square is divided into two triangles by one of its diagonals.

    b. Use one of the words *equilateral*, *isosceles*, or *scalene* to tell what kind of triangles are formed. Explain your answer.

Scoring Guide

Score	Description
2	Student gives correct answers with appropriate explanations for each part.
1	Student gives correct answer with appropriate explanation for one part.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

SCORE POINT 2
(EXAMPLE A)

⑬
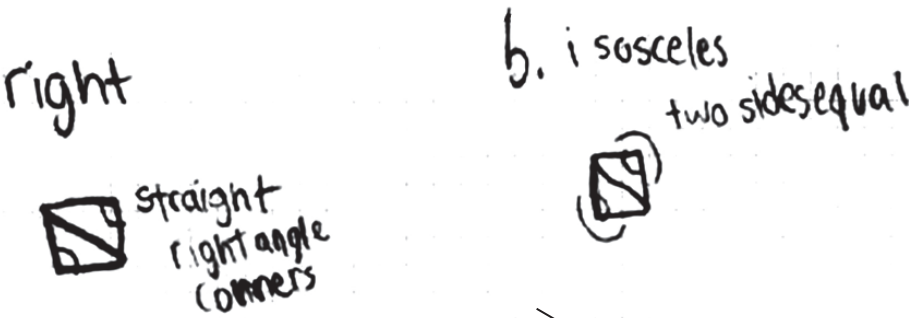
right

b. isosceles
two sidesequal

straight
right angle
corners

Student's response to each part is correct, with appropriate explanations.

SCORE POINT 1
(EXAMPLE A)

⑬

A) right angles were formed because they are 90°

B.) an iscosceles triangle was formed because it has 2 sides the same length, and 1 that is long.

b) Student's response is correct, with appropriate explanation.

a) Student's explanation is insufficient to receive credit.

SCORE POINT 1
(EXAMPLE B)

⑬   a. The triangles are right triangles because they each have on right angle from the square they were made from.

b. They are scalene triangles beause they have 2 sides that are the same length.

Student's response is incorrect.

Student's response to part a is correct, with appropriate explanation.

SCORE POINT 0
(EXAMPLE A)

⑬   A) it is acute triangles
inside 90°
inside

B) they are scalene triangles
2 of the sides are congruent.

Student's responses to both parts are incorrect.

17

DSP 6.4	**Uses counting techniques to solve problems** in context involving combinations or simple permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, <u>Fundamental Counting Principle</u>, or others).

14 Five people applied for jobs at a store. Only two of these five people will be hired. How many different pairs of people could be hired? Show your work or explain how you know.

Scoring Guide

Score	Description
2	Student gives correct answer, **10**, with sufficient explanation or work shown to indicate correct strategy.
1	Student gives the correct answer with insufficient or no explanation or work shown. OR Student demonstrates appropriate strategy with incorrect or no answer.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

SCORE POINT 2
(EXAMPLE A)

⑭

Five people: George=G   Pairs: G+B
            Bob =B   G+F
            Fred =F   G+R
            Rob =R   G+M   R+F 15
            Moe =M   B+F   R+M 16
                                   B+R   R+M 17
10 different pairs could be hired. B+M F   M+R 18
                                   B+M   M+R 19
20 counting duplicates. Ex. G+M   G+R 9   M+R 20
                             M+G   F+R 10
                                   F+M 11
                                   F+M 12
                                   F+M 13
                                   B+B 14

Student's response is correct, with sufficient work shown to indicate correct strategy.

SCORE POINT 2
(EXAMPLE B)

⑭

10 people

AB   CD
AC   CE
AD   DE
    E
BC
BD
BE

Student's response is correct, with sufficient work shown to indicate correct strategy.

**SCORE POINT 1
(EXAMPLE A)**

Student's strategy is appropriate, with incorrect answer.

**SCORE POINT 1
(EXAMPLE B)**

Student's strategy is appropriate, with incorrect answer.

SCORE POINT 0
(EXAMPLE A)

14 2 pairs because two can only go into 5 twice.

Student's response is incorrect.

F&A 6.3   **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving two or more of the four operations; or by evaluating linear algebraic expressions (including those with more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when x=4 given y = 3x-2).

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⑮ The cost, in dollars, for school groups to go to a museum can be calculated by using the expression $10t + 5s$, where t is the number of teachers and s is the number of students.

   a. Jamestown School has a group of 3 teachers and 40 students going to the museum. How much will it cost, in dollars, for the group from Jamestown School to go to the museum?

   b. The total cost for a group from Martinsburg School to go to the museum is $290. If there are 50 students in this group, how many teachers are in the group? Show your work or explain how you know.

   c. Fill in the chart below to show three different possible groups of teachers and students that would be charged exactly $125 to go to the museum.

	Number of Teachers	Number of Students	Total Cost
Group 1			$125
Group 2			$125
Group 3			$125

Scoring Guide

Score	Description
4	5 points
3	4 points
2	2 or 3 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point   for correct answer, **230** (dollars)

Part b: 2 points   for correct answer, **4** (teachers), with sufficient work shown or explanation given to indicate appropriate strategy

OR

1 point   for correct answer, with insufficient or no work shown or explanation given to indicate appropriate strategy

or

for appropriate strategy shown with incorrect or no answer

Part c: 2 points   for three correct pairs of numbers that solve $10t + 5s = 125$

OR

1 point   for two correct pairs of numbers that solve $10t + 5s = 125$

SCORE POINT 4
(EXAMPLE A)

15

a.) $230

a) Student's response is correct.

b.) $50s = 250 + 40 = 290$

~~4 teachers~~

b) Student's response is correct, with sufficient work shown to indicate correct strategy.

c.)

	number of teachers	# of students	total cost
group 1	5	15	$185
group 2	8	9	$125
group 3	1	23	$125

c) Student's response includes three correct pairs of numbers.

SCORE POINT 4
(EXAMPLE B)

15

a. $c = 10t + 5s$
   $10(3) + 5(40) = \$230$

> a) Student's response is correct.
> (Showing work is not required.)

b.

$10t + 5(50)$

$5(50) = 250$

$\begin{array}{r} \$290 \\ -250 \\ \hline 40 \end{array}$

4 teachers

$10(4) + 5(50) = 290$

> b) Student's response is correct, with sufficient work to indicate correct strategy.

c.

	# of teacher	# of students	total cost
group 1	2	21	$125
group 2	3	19	$125
group 3	4	17	$125

> c) Student's response includes three correct pairs of numbers.

SCORE POINT 3
(EXAMPLE A)

15

a) Student's response is incorrect.

A) In dollars it will cost $50 for the group from Jamestown School to go to the museum.

b) With 50 students in the group there will be 4 teachers, because 5×50 = 250 and 10×4= 40, 250+40 = 290. So that makes 290 dollars.

c)

	Number of Teachers	Number of Students	Total Cost	
Group 1	1	23	$125	10×1=10 5×23=115 10+115=125
Group 2	2	21	$125	10×2=20 5×21=105 20+105=125
Group 3	3	19	$125	10×3=30 5×19=95 30+95=125

b) Student's response is correct, with sufficient explanation shown to indicate correct strategy.

c) Student's response includes three correct pairs of numbers. (Showing work is not required.)

⑮

a) $30 + $200 = $230.00

a) Student's response is correct.
(Showing work is not required.)

b.) 5×50 = $250   4 teachers
         260
         270
         280
         290

b) Student's response is correct,
with sufficient work to indicate
correct strategy.

c.)

	Number of Teachers	Numbers of Students	Total Cost
Group 1	2	11	$125
Group 2	10	5	$125
Group 3	9	7	$125

c) Student's response includes two
correct pairs of numbers.

15

Ⓐ $3 \cdot T + 40 s$

a) Student's response is incorrect.

Ⓑ $50 \times 5 = 250 + 12.5 = ^{\$}290$

b) Student's response is incorrect.

Ⓒ

	# of teachers	# of students	Total Cost
Group 1	2	21	$125
Group 2	1	23	$125
Group 3	3	19	$125

c) Student's response includes three correct pairs of numbers.

SCORE POINT 2
(EXAMPLE B)

⑮

a. Answer is $230.⁰⁰

   t = 3 and s = 40

   10·3 + 5·40 = ⟨230⟩
   30 + 200

a) Student's response is correct. (Showing work is not required.)

b. There are 4 teachers.

   10t + 5·50 =
   40 + 250 = 290

   250
   + ?
   ‾‾‾‾‾‾
   290 ? = 40

b) Student's response is correct, with sufficient work shown to indicate correct strategy.

c.

	# of teachers	# of students	total cost
group 1	2	20	125
group 2	20	2	125
group 3	3	19	25

c) Student's response contains only one correct pair of numbers.

15

a) Student's response is correct.

a. it will cost 230#

b. 8 teachers

$$\begin{array}{r} 58 \\ 5\overline{)290} \\ -25 \\ \hline 40 \end{array}$$

b) Student's response is incorrect.

C.

# of teachers	# of students	total cost
Group 1	0	25	125
Group 2	5	15	125
Group 3	10	5	125

c) Student's response contains three correct pairs of numbers.

SCORE POINT 1
(EXAMPLE A)

⑮

a) Student's response is incorrect.

Ⓐ 570

Ⓑ 58   teachers

b) Student's response is incorrect.

Ⓒ

	Number of teachers	Number of students	Total cost
Group 1	5	15	$125
Group 2	10	5	$125
Group 3	2	20	$125

c) Student's response contains two correct pairs of numbers.

SCORE POINT 1
(EXAMPLE B)

⑮

A

$230.00

a) Student's response is correct.

B

$$50\overline{)2900}$$
x x 5 8
- 2 5 0
0 4 0 0
4 0 0
0 0 0

58

b) Student's response is incorrect.

C

	teacher	student	total cost
91	3	20	125
92	2	30	125
93	4	15	125

c) Student's response is incorrect.

⑮

A) It will be 10 dollars for all the teachers and five for all the students.

a) Student's response is incorrect.

B) There are 29 teachers in the group.

b) Student's response is incorrect.

C)

	Number of teachers	Number of students	total cost
Group 1	10	5	$125
Group 2	20	10	$125
Group 3	30	20	$125

c) Student's response includes only one correct pair of numbers.

SCORE POINT 0
(EXAMPLE B)

15

Ⓐ $230

a) Student's response is incorrect.

Ⓑ No clue

b) Student does not respond.

Ⓒ

	# of teachers	# of students	total
group 1	10	5	125
group 2	?	?	125
group 3	?	?	125

c) Student's response includes only one correct pair of numbers.